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ABSTRACT

This paper describes a study to determine whether students can, with appropriate instructional materials, develop and apply a knowledge of art concepts. An opening section reviews research on concept acquisition. This study utilized a concept acquisition model developed in 1970 by R. Gagne. Gagne's model proposed that concepts are learned through a hierarchy of processes including verbal information and problem solving. For the study, curriculum materials were developed based on art concepts of drawing, form, space, composition, line, and proportion. Subjects were 70 seventh and eighth graders from two schools in Mississippi. The students were divided into four classes: the two control classes received normal art instruction and the two experimental classes received instruction supplemented with occasional classwork and discussion based on the specially-developed curriculum materials. A posttest for all four classes required students to write critiques of a drawing and a painting. The critiques were analyzed for correct use of concept terms, number of value terms ("good," "bad"), and length. Results indicated that students in both experimental groups used concept terms more frequently and more correctly, and they wrote longer critiques. (AV)

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VALIDATING A MODIFIED GAGNEAN CONCEPT-ACQUISITION MODEL: THE RESULTS OF AN EXPERIMENTAL STUDY USING ART-RELATED CONTENT

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VALIDATING A MODIFIED GAGNEAN CONCEPT-ACQUISITION MODEL:

THE RESULTS OF AN EXPERIMENTAL STUDY USING ART-RELATED CONTENT

One of the major problems in the fields of art and aesthetic education is the fact that many of the terms and concept-labels used by art educators are vague poorly defined, used inconsistently, and loosely interpreted. Thus, the meanings of critical terms essential to higher levels of thinking about art are unclear to students. This uncertainty is increased since these meanings often vary from teacher to teacher and within a teacher's own use of these terms. However art teachers seem to assume that their students' understandings of the terms and concept-labels being used are similar to their own. Consequently, since art teachers often fail to specifically define or clarify the terms which they use, they directly contribute to a discrepancy between what they as art teachers teach or think they teach and what they, in fact, do teach. If student conceptions of critical art-related terms and concepts are vague or contrary to what is intended by the teacher, then they may easily misuse or not use these terms in their own art-and aesthetically-related activities and critiques. Without an adequate and consistent understanding of art-related concepts and terms, students are not likely to be able to understand, explain, interpret, or make meaningful decisions about art--their own and that of others.

To determine whether or not students could acquire an adequate conceptual frame of reference for critiquing art processes and products, instructional materials consistent with one model of concept-based learning were developed, used, and tested in jr. high school art classes. This paper describes the background leading up to this study, the details of the experimental study itself, and the results of the data analysis.

Review of Concept-Acquisition Theories and Research

The acquisition of concepts and conceptual understanding is valued among learning theorists and educators in a number of different content areas (Gagne, 1970; Martorella, 1971; Piaget and Inhelder, 1969; Spitzer, 1975; Stahl, Button, and Corbett, 1975; Tennyson and Boutwell, 1974). These individuals contend that the acquisitions of concepts is critical for a deep understanding of any content or activity. Concepts are also an integral aspect of art education. Of particular importance to teachers is the integration of concept-based learning into the areas of art criticism, art history, and aesthetic appreciation (Eisner, 1972; Hausman, 1963). Additionally, an understanding of concepts and associations with their appropriate labels is necessary for understanding the techniques and comprehending the nature and qualities of various media and mediums used by art students who seek to acquire or improve technical art skills.

Concepts may be defined as abstractions by which men sort out and arrange different aspects of their experiences and environment (Spitzer, 1975; Stahl and Webster, 1976, 1978; Stahl, et al., 1975). To these authors, con-

cepts are phenomena which exist as abstractions which in turn may be described in terms of specific attributes. Finally, where these attributes are defined for a specific phenomenon, one assigns a label to this group of attributes. The authors make it clear that the concept is the abstract phenomenon itself and is not the label or list of attributes which seek to describe this abstraction.

Tennyson and Boutwell (1974) have defined a concept as a class of objects or ideas (abstract phenomenon) which are characterized by the same critical attributes. All of these sources agree that labels or names are used to denote concepts and both caution their readers to avoid equating the concept with its assigned label. The importance of this distinction is easily understood when one realizes that the remembrance of a label like the term "design" is vastly different from understanding "design" as an abstraction useful in viewing several diverse art objects and accurately describing how each uses "design".

Since concepts are abstractions, concept acquisition then is the comprehension (acquisition) of a concept as an abstraction and is not merely the knowledge of a set of relevant attributes or a definition. Thus, concept acquisition is considered to be an internal process whereby a person identifies, describes and distinguishes the features of abstract phenomenon which may be present or encountered in an external source in the environment and associates this understandingly with a label. It is expected that the results of this acquisition can and will be used consistently in later situations.

Spitzer (1975) suggests that some degree of generalization is involved in concept formation. He also reports that other theorists have referred to such activities as classifying, categorizing, sorting out, grouping, and discriminating in their respective descriptions of the process of concept formation. Tennyson and Boutwell (1974) have divided concepts into two groups (i.e., definition and observation) and argue on behalf of acquiring concepts via these two means. Martorella (1971) developed models for use in concept acquisition in the social studies which focus on the conceptual thinking of Taba, Piaget, DeCecco, and Gagne. Gagne (1970) has proposed a "learning heirarchy" based upon the development of conceptual understanding and the use of this understanding in problem solving situations. Following the suggestions of Casteel (Casteel, et al., 1974), Stahl and his associates used a modified Gagnean model to develop social studies (1975) and art education (1977) concept-acquisition learning activities.

Woodson (1974) identified three types of paradigms relevant to the acquisition of concepts by individuals. These are: 1) the instructional paradigm which takes advantage of the communication skills possessed by the instructor and the learner within their natural environment; 2) the reception paradigm in which the instructor determines a sequence of positive and negative instances of the concept that are presented to the learner one at a time; and 3) the selection paradigm in which the learner selects (predicts) which pattern comes next and all possible positive and negative instances of the concept are usually available.

Woodson's research focused on the instructional paradigm. He identified seven specific instructional modes relevant to this particular approach to concept teaching. As identified, these seven modes are (a) stating of a definition, (b) providing instructions intended to identify the relevant or critical attributes, (c) providing instructions intended to identify irrelevant attributes, (d) showing of examples of the concept, (e) showing of non-examples of the concept, (f) description of the domain of the concept, and (g) using analogies to describe the concept. He constructed four measures of concept learning, i.e., definitions, exemplars, nonexemplars, and classifications, in order to compare student achievement (levels of concept acquisition) following instruction using these seven modes. His study revealed that the identification of a concept's relevant attributes was the most effective instructional strategy of those used. However, Woodson's use of college students in the study warrants some caution to the generalizability of his findings since these individuals are more experienced concept learners and may have transferred abilities gained elsewhere to this instructional setting.

Frayer, Ghatala and Klausmeir (1975) argue that concept acquisition instruction should be designed specifically to facilitate the attainment of each of the four levels of the Concept Learning and Development (CLD) model. The CLD model analyzes concept attainment as occurring in an invariant sequence at four successfully higher levels--the concrete, identify, classicatory, and formal. The model assumes that inasmuch as one or more new cognitive operations are essential for the attainment of each successive level of a concept, and since some other new abilities emerge with learning and maturation, instruction should be designed specifically to facilitate the attainment of each level in succession. Hence, acquiring the name of the concept as well as discriminating between and naming the defining attributes can occur at any of the first three levels, they are prerequisite at the formal level. These authors conclude by stating that four categories of variables can be manipulated with considerable precision in designing instructional materials for teaching the classificatory and formal levels of the CLD model. These variables include the use of concept examples and nonexamples, a definition of the concept, emphasizers that facilitate discrimination between examples and nonexamples, and feedback (Klausmeir and Feldman, 1975).

In a general review of the research literature, Klausmeir and Feldman (1975) cited many researchers who have studied these four variables over the past several years. They mention six studies which reported that providing examples and nonexamples of a concept is most effective when the examples vary widely in irrelevant attributes while the nonexamples differ from the examples in only one relevant attribute at a time. This combination of attributes/nonattributes and example/nonexample has been labeled a "rational set." They conclude that their studies and research reveal the significant facilitative effects that rational sets have had on the concept learning of students in a wide variety of content areas from the fourth through the college levels. They speculate further that the results of these studies would generalize across grade levels and content areas if similar materials were used and if the students could "read well."

However, after reviewing over 200 articles relative to the whole area of concept teaching and concept acquisition, Clark (1971) found that less than 10 percent of the research articles cited had reported using concepts one would usually find used in a school classroom setting. Thus, while the research literature tends to support some instructional concept-acquisition models as being more effective than others and that these models are useable in a variety of content areas and grade levels, Clark's contends that the concepts that have been "taught" by these models are irrelevant to the content being studied in the classrooms of our nation's schools. One could conclude that many advocated models may be applicable only to the acquisition of irrelevant concepts.

The findings outlined by Clark argue for the need for research studies to use carefully developed instructional materials to assist students acquire concepts directly related to the actual art content they are studying. Art educators and theorists alike agree on the importance of increasing conceptual understandings in all aspects of art and aesthetic education (Lowenfeld and Brittain, 1964; Eisner, 1972; Frankston, 1970; Hausman, 1963, Klausmeier and Feldman, 1975). It is believed that the acquisition of art-related concepts would result in increased student:

a. appreciation of aesthetic and art activities and products;

b. capabilities in the area of their critiques of art and in their making of aesthetic judgments and evaluations;

c. insights into the nature and possibilities of various art media and mediums;

d. understanding of the techniques and methods necessary in performing various art-related skills; and

e. comprehension of art history, trends, styles, techniques, and products.

With these potential student outcomes in mind, materials consistent with one concept acquisition model were developed and incorporated within regular jr. high school art classrooms. The effects of these materials upon students via their written responses in two art critique assignments were then measured.

Brief Overview of the Concept Acquisition Model

Gagne (1970) has proposed an eight level "learning hierarchy" based upon the development of conceptual understanding and the use of this understanding in problem-solving situations. The prerequisites and

conditions of learning stipulated in Gagne's model are more applicable to the natural hierarchies' found in the pure sciences and are somewhat dysfunctional when applied to the social sciences, humanities, and the arts. To fit the special needs of these non-pure disciplines, Casteel et al (1974) suggested some important modifications in the Gagne model.[1]

Working entirely with only the five highest levels of learning as identified by Gagne, Casteel described the "conditions" that should be present for students to acquire learning on one level as well as those needed for students to transfer this learning to the next higher level. Casteel's model assumes no natural hierarchy of content or concepts within the social sciences, humanities, or the arts. According to the modified Gagnean model, each of the levels of learning can be precisely described and instructional materials and experiences congruent with each level can be planned, used, monitored and assessed objectively.

Five levels of learning or concept acquisition and utilization are relevant to conceptually-based art and aesthetic instruction (Stahl and Webster, 1976, 1978). In order of their complexity from lowest to highest, these levels are Verbal Information Learning, Concept-level Learning, Principle or Rule Learning, and Problem-solving Learning. They come into play once the teacher has developed a biconditional abstract definition of the concept(s) to be studied. In other words, the teacher has to first develop definitions such as the following, "If and only if there is an empty place in which an imaginary point could move in any direction, then space exists," before students are able to engage in the first of these five levels of learning. At this point, each of these levels can be described in the order of their hierarchial sequence.

1. Verbal Information Learning. Once the concept label definition has been developed, the teacher possesses the basis for the first and lowest level of learning incorporated into the model. The Verbal Information Learning level serves to make sure students accurately comprehend and process the verbal information related to the particular concept being studied

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[1]The modifications made in the Gagne model were originally suggested and developed by J. Doyle Casteel, Professor of Education, University of Florida, as part of a year long project to develop conceptually-oriented, problem solving instructional materials for social studies classroom use. Stahl, Button, and Corbett, co-workers with Casteel on the project, provided a detailed description of the modified model in relation to planning social studies learning activities. In 1976 and 1977, Stahl and Webster applied the model to the domain of art and aesthetic education. This study stressed the applicability of the modified Gagne model to art education.

(i.e., the biconditional abstract definition). Steps must be taken by the teacher to ensure students comprehend the meaning of the abstract definition in terms they themselves understand. During this level of learning, students restate the abstract definition in their own words such that the paraphrased definition is congruent with the originally stated teacher definition. In this way the student demonstrates understanding of the prerequisite verbal information needed to advance to the next higher level of conceptually-oriented thinking.

2. Discrimination Learning. When students discriminate, they treat things differently. According to the model, once the student has mastered the appropriate verbal information, the student is ready to apply this information to correctly sort out objects in his/her environment. On this level, the student is prepared to treat examples of the concept differently from nonexamples of the same concept. When the student successfully distinguishes between a number of examples and nonexamples of the concept, then the student has demonstrated Discrimination Learning abilities.

When written, a Discrimination Learning activity consists of a pair of choices--one of which is an example of the given concept and one which is a nonexample of the same concept. Examples of the concept include all of the relevant attributes of the concept as these are stipulated in the biconditional abstract definition. These examples should not allow students to make any inferences about whether or not one or more of these attributes exist but are just not described in the particular example being used. Students are to study each pair of options and then correctly select the option which is consistent with the verbal information previously studied. According to the model, when students correctly discriminate between example and nonexample on a number of pairs of options, then they are ready to transfer this learning to the Concept-level of learning.

3. Concept-level Learning. Conceptual understanding includes the ability to recognize seemingly diverse phenomena as being examples of this concept. Thus, students would comprehend the concept as an abstraction and thereby can "abstract" from a given series of events specific examples of the one or more concepts present in these events. Once this level of conceptual understanding is attained, students can more completely and accurately analyze their own environment and experiences and make more consistent

judgments about them. It is this power of indepth analysis that the Concept-level of learning is designed to reach.

Concept-level Learning activities are designed to assist students develop their understanding of a concept by having them make more complex types of discriminations between examples and nonexamples of the given concept. On this level, activities are similar to those developed for the Discrmination Learning level except that instead of containing only one example and one nonexample of the concept, each of these activities include either three examples and one nonexample or three nonexamples and one example of the given concept. As such, these activities force students to make higher level discriminations and to treat three diverse phenomena as being the same (i.e., as either all examples or all nonexamples of the concept). Once students have demonstrated the ability to operate effectively on this level, they are ready to transfer this conceptual ability to even more complex levels of concept-oriented learning and thinking.

4. Principle or Rule Learning. One way of stating relationships among and between concepts is in the form of principles or rules. In the language of the model, one may form a principle or rule by chaining two concepts, e.g., "If a drawing exists, then composition also exists." Since principles are propositions that are sufficiently probable to warrant verification in particular cases, art-related principles should be (and are) based on logical (and verifiable) grounds. For example, in the principle state above, drawing is not only chained with composition, but the principle itself states a proposition (relationship) which has a high degree of probability of being valid. Thus a person who examines a drawing would expect to find composition also present.

When written, activities to develop Principle Learning skills include the identification of several events or phenomena which demonstrate the particular principle or rule being learned. Students may be given a number of possible principles from among which they are to select the correct one to explain the phenomena on hand. In other situations, students may be presented with a partial situation and be asked to predict the events in the missing segment based upon information given in the first segment and what they know about relationships which exist among the group of concepts being studied. In both types of activities, students are asked to chain concepts such that the resulting principle or rule is useful in explaining or predicting a complex phenomena.

5. Problem-solving Learning. Here, students chain principles or rules in order to analyze, consider alternatives, deliberate over consequences, and make decisions about art-related events or products. Students are called upon to combine principles which form meaningful explanations for and critiques of the art phenomena or product they are examining. For example, students may

take two separate principles (e.g., "If a drawing exists, then composition also exists" and "If composition, then form is likely") and use these to create one statement likely to be used to analyze and critique a work of art (e.g., If a drawing exists, then composition and form are also likely to be present). Hence, students may then suggest that "if you want to 'improve' a drawing, then one may need to improve the 'composition' and/or 'forms' which were used." As students learn to develop, use, and test combinations of principles, they learn to acquire sound criteria for making decisions and solving problems in the area of art and aesthetics.

Instructional activities consistent with the five levels of the model tend to function in three ways. First, they help identify those students who cannot operate successfully on a given level. Second, they help identify those students who are already operating on a given level or higher levels of concept-oriented thinking. Thirdly, they may serve to provide the conditions which should enable students to build upon their previous lower level learnings in order to develop higher level learnings. In the language of the model, students would "transfer" certain understandings from one level to assist them in learning at the next higher level. Used in this way, these instructional activities become learning activities for students. When students demonstrate successful completion of a number of activities on each of these levels, then the teacher has available data on the basis of which he can infer that student conceptual learning has taken place, i.e., the student has acquired and can use the concept as an abstraction.

Instructional activities based upon the first three of these levels were developed for six concepts commonly used in art classrooms. These concepts were drawing, form, space, composition, line, and proportion. Students in the Experimental group were given these activities while the Control group students were handling these concepts in the manner their art teacher usually followed in teaching these concepts. With no prior warning, students of both groups were asked to write critiques of a drawing and a painting. The researcher posited that not only would the Experimental group students show greater understanding of these concepts by using them more often in their critiques, but that they would use more value terms in their critiques as well as write longer critiques than their Control group counterparts.

HYPOTHESES

This study sought to investigate eighteen product variables related to the number of concept-labels students used in their art critiques, the number of value terms the students incorporated into their critiques, and the number of words the students used in critiquing a drawing and a painting. The specific hypotheses formulated for this study were:

A. There would be no significant differences between the seventh grade Experimental group art class and the eighth grade Control group art class in terms of the:

1) number of concept-labels they used in their respective critiques of a drawing and a painting;

2) number of value terms they used in their respective critiques of a drawing and a painting; and

3) total number of words they used in their respective critiques of a drawing and a painting.

B. There would be no significant difference between the eighth grade Experimental group art class and the eighth grade Control group art class in terms of the:

1) number of concept-labels they used in their respective critiques of a drawing and a painting;

2) number of value terms they used in their respective critiques of a drawing and a painting; and

3) total number of words they used in their respective critiques of a drawing and a painting.

C. There would be no significant difference between the combined seventh and eighth grade Experimental group art classes and the combined eighth grade Control art classes in terms of the:

1) number of concept-labels they used in their respective critiques of a drawing and a painting;

2) number of value terms they used in their respective critiques of a drawing and a painting; and

3) total number of words they used in their respective critiques of a drawing and a painting.

These three groups of statements stipulate the eighteen null hypotheses tested in this experimental study.

DESIGN AND PROCEDURES

Design

Following the research design notation scheme outlined by Campbell and Stanley (1963), the design for this experimental study was as follows:

R	X_1	O_1
R		O_2

This design is identical to that referred to by these authors as the Posttest-Only Control Group Design.

The 12 factors which possessed the potential to jeopardize the internal and external validity of this study were examined. This examination revealed that all eight threats to internal validity and one of the four threats to external validity (Interaction of Testing and Treatment) were reduced by the use of the procedures employed.

Subjects

The subjects for the study were 70 of 79 seventh and eighth grade students enrolled in elective art classes in two Columbus, Mississippi public jr. high schools. These schools are racially-balanced as a result of bussing and both serve families from approximately the same socio-economic level. One school was a seventh grade center and one an eighth grade center. One of the teachers taught in both schools while the second teacher taught only in the eighth grade center. Two classes taught by each of the two art teachers in these schools were randomly selected to participate in the study.

As a consequence of this procedure, the Experimental Group classes consisted of one seventh and one eighth grade art classes while the Control Group classes consisted of two eighth grade art classes. The two Experimental classes were then randomly matched with the two Control classes such that the one seventh grade Experimental Group class was matched with one of the two eighth grade Control Group classes and the eighth grade Experimental class was matched with the other Control Group eighth grade class. Once paired, information received from the two teachers revealed the Control Group classes had 9 less students than the two Experimental Group classes. In order to equalize the groups, 3 seventh and 6 eighth grade Experimental Group students were randomly selected and dropped from the data analysis segment of this study. Hence, 20 seventh graders were compared with 20 eighth graders and 15 eighth graders were compared with 15 eighth graders.

Procedures

The two teachers who volunteered to participate in the study were asked to teach their art classes as they would normally teach them. However, both were informed that the study would focus on major concepts used in art production and critiques. Both teachers taught in the same school system.

Information received from these teachers revealed they were both teaching approximately the same content using similar methods while their students were engaged in similar classroom projects and activities. The seventh grade Experimental group class had about two weeks of additional drawing time than did the three eighth grade classes while the two eighth grade Control group classes had four weeks of study with water colors that neither of the two Experimental group classes had experienced.

The teacher working with the Experimental classes was given instructional materials related to each of the six concepts selected for the study. These materials consisted of a precise biconditional definition of each concept-label and a series of up to five 2-option and four 4-option multiple choice items in which her students were to correctly identify the options which were congruent with the stated definition.

On six separate days during a ten day period, materials related to one of the concepts were presented and discussed in class. This took from 15 to 30 minutes of class time each of the six days. For the rest of the period, students were engaged in their regular art activities. During this time, the teacher asked and answered questions, provided reactive comments, and critiqued student art using the concept-label studied in class that day. Meanwhile, the Control Group teacher had her students working on their own art projects and activities while she presented art-related content, asked and answered questions, provided reactive comments, and critiqued student art in her usual manner.

One week following the presentation of the sixth concept-label materials to the Experimental classes, the posttest was administered. None of the four classes used in the study were informed of the test ahead of time. In addition, students in the Experimental classes were never told they would be held responsible for remembering, knowing, or using the labels or definitions at a later date.

Treatment

Materials related to the concept teaching model (Stahl, et al, 1975; Stahl and Webster, 1976, 1977) were developed and field-tested in the Summer and Fall, 1976, for the purpose of determining what revisions were needed in their design, construction, or manner of presentation within the classroom. Information received via feedback from the trial teacher and her students suggested modifications were necessary in the areas of how the materials were presented in class and how to incorporate these concepts into on-going classroom art studies and activities. Changes consistent with this input were made prior to the conducting of this study during February, 1977.

The treatment materials themselves consisted of the following five components:

a) a concept-label

b) a bi-conditional abstract definition;

c) a space for students to write a paraphrased definition congruent with the one provided (Verbal Information Learning level);

d) a set of up to five 2-option multiple choice items (Discrimination Learning level); and

e) a set of up to four 4-option multiple choice items (Concept Learning level). (See Figure 1).

Figure 1 about here

On each of six different days, the Experimental Group students received a one page sheet which provided all the learning materials for one concept-label. On the day these materials were used, the teacher (a) passed out the single page papers, (b) asked students to study the bi-conditional definition, (c) had students write a paraphrased definition of the one provided, (d) checked during a short discussion to see if there was congruency between the written definition as stated and the paraphrased one, (e) had students read through and check the correct answers to the eight multiple choice items, (f) discussed with students their answers to these items, and (g) picked up all the materials from the students. For the rest of the period the students were allowed to work on their own individual art projects and assignments. During this period, the teacher used and encouraged her students to use the concept-label studied in class that day in commenting about their activities and products. The teacher did not use the concept label on days following its formal presentation in class.

The materials for the six concept-labels were covered on six separate days during a two-week period. The posttest was administered one week after the sixth set of materials was studied in the Experimental classrooms.

Instrumentation

In constructing the posttest, it was decided that an instrument asking students to define the concept-labels would only test the abilities of the Experimental students to remember the definitions given in class and would bias the data in favor of the Experimental Group. If this were the case, the resulting posttest data would be of little value.

Hence, it was decided to have the students in both groups write critiques of two different art pieces they had never before encountered. This posttest assignment would measure the spontaneous use of these concepts by these students and would provide some indication of the holding and utility power of the instructional materials and the definitions used. Furthermore, such a posttest would suggest the conceptual understanding of these students relative to the application of conceptual knowledge in situations where this knowledge was relevant.

A drawing and a painting from the private collections of two MUW faculty members were used as the focal points of the posttest. In addition to these art works which were hung in front of the respective classrooms, the students received a sheet of paper upon which was printed the following set of instructions:

> "In front of the room you will find an illustration of a man smoking a cigarette. After studying the illustration, use the space below to describe what you see. Your description may include the identification of its good and bad points. You may also include comments regarding the style of the artist."

For the painting the instructions were identical except for the substitution of the words "two hands" for "a man smoking a cigarette." The students were allowed as much time as they needed in order to complete their critiques.

The resulting critiques were then content analyzed in terms of three distinct types of variables: (a) the number of each of the six concept-labels used correctly (e.g., "line" would be correct whereas "out-line" would not be considered correct use of the concept-label "line"); (b) the total number of value terms (e.g., "good," "bad," "poor," "wrong," "lousy," etc.) used within the entire critique; and (c) the total number of words included in the critique. These variables provided the basis for the statistical analysis aspect of the study.

Statistical Analysis

An analysis of variance statistical procedure was performed to determine the degree of difference between the two groups in respect to the dependent variables examined in this study. In all cases, the decision to accept the hypothesis was based on a .05 level of significance.

RESULTS

The results for the eighteen (18) hypotheses posited for this study are presented below. These hypotheses focused on three major categories of variables; the students' use of concept-labels, value terms, and total words in their respective critiques of a drawing and a painting. Data for the four groups of students were analyzed in terms of comparing each Experimental Group class with its respective Control Group counterpart and the two Experimental Group classes combined with the combined Control Group classes. Student data for the drawing were analyzed separately from their painting critique data.

Because these hypotheses formed natural subgroups of related data, the results of the analysis of the posttest data are presented along these lines.

Hypotheses Related to Student Critiques of a Drawing

The seventh grade Experimental Group art class was compared with a randomly assigned eighth grade Control Group art class. (see Tables 1 and 2) Of the three variables examined, the Experimental Group was found

to differ significantly only in terms of the total number of concept-labels used by the students ($p = .0001$). The two groups were no different in their respective use of value terms ($p = .95$) and the length of their critiques ($p = .08$).

The eighth grade Experimental Group art class was compared with the second eighth grade Control Group art class. Of the three variables examined, the Experimental Group was found to differ significantly in terms of the total number of concept-labels used ($p = .001$), number of value terms used ($p = .008$), and on the length of their written critiques ($p = .0001$).

Tables 1 and 2 about here

When the data from the seventh and eighth grade Experimental Group art classes were combined and compared with the data from the two Control Group art classes, it was found that the Experimental Group differed significantly from the Control Group on total number of concept-labels used ($p = .0001$) and length of their critiques ($p = .0001$). However, they did not differ on the use of value terms included within their written critiques ($p = .11$).

In summary, of the nine variables examined in regards to the students' critique of the drawing, these two groups differed significantly on six. Most importantly on the three variables dealing directly with their correct use of concept-labels, the Experimental Group classes differed significantly from the Control Group art classes on all three variables.

Hypotheses Related to Student Critiques of a Painting

In respect to their critiques of a painting, the seventh grade Experimental Group art class was again compared with its designated eighth grade Control Group art class. (See Tables 3 and 4) Of the three variables examined, the Experimental Group was found to differ significantly in terms of their use of concept-labels ($p = .005$) and the length of their critiques ($p = .03$). They were not different from each other in their use of value terms in describing the painting ($p = .28$).

When the eighth grade Experimental Group art class was compared with its respective Control Group art class, it was found that the Experimental Group differed significantly from the Control Group along all three variables, i.e., use of concept-labels ($p = .001$), use of value terms ($p = .004$), and length of written critiques ($p = .0001$).

Again, the two Experimental and two Control Group art classes were combined and their resultant data compared. Of the three variables examined, the combined Experimental Group classes differed significantly from the combined Control Group classes in their correct use of concept-labels ($p = .0001$) and the length of their critiques ($p = .0001$). However,

they were not different in the number of value terms they included in their critiques ($p = .136$).

Tables 3 and 4 about here

To summarize, of the nine variables comparing the critiques of a painting by these two groups of art students, it was found that they differed significantly on seven of these variables. As with the drawing, these groups differed significantly on all three variables which dealt with their use of concept-labels.

Summary of the Results of the Hypotheses-Related Data

In review, eighteen hypotheses were tested relative to these students' use of concept-labels, value terms, and words in their critiques of a drawing and a painting. Of these eighteen, these students were found to differ significantly on thirteen variables. Of the six variables which dealt directly with the use of concept-labels, the Experimental Group students differed significantly from their Control Group counterparts on all six variables. These two groups also differed significantly on five of the six variables describing the length of their respective critiques but on only two of the six variables dealing with the use of value terms in their written critiques.

In addition to the formal research hypotheses described and tested above, five "unofficial" hypotheses were identified which concerned the "carry over power" of the conceptual understandings developed by these students. It was assumed that these students would have little difficulty carrying their conceptual understandings from one art media (drawing) to another (painting). Thus, if the assumption was valid, there would be no significant difference within each of these groups in their use of concept-labels when critiquing a drawing and a painting. If such a difference did exist, then one may speculate that student acquisition of some art-related concepts may be most useful in critiquing the art media closest to that which students were engaged in while they were "acquiring" the concept.

When the data were examined, it was found that both Experimental Group art classes and one Control group art class differed significantly in the use of concept-labels in critiquing the drawing and painting (see Table 5). The one remaining Control Group art class was found to use about the same number of concept-labels in both of their art critiques ($p = .24$). Overall,

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Table 5 about here

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when taken as one group, it was found that the 70 students differed significantly in their use of these concept-labels in their respective art critiques ($p = .0001$).

DISCUSSION

The findings indicate that students can acquire a conceptual understanding of art concepts via paper and pencil formats when these concepts are specifically defined and when the subsequent written learning activities follow the procedures outlined by the model. In addition, when these concepts become used in discussions the teacher and students share in the classroom, there seems to be even greater likelihood that these concepts will be acquired. Furthermore, such acquisition greatly ensures that the students will use these concepts in their spontaneous critiques of art works. Of equal importance is the finding that the more traditional approach to helping students learn and understand art concepts produced virtually no use of art concepts in the students' critiques of identical art works. In other words, the significant differences found between the Experimental and Control Groups may best be explained by stating that the traditional approach teaches little real conceptual understanding of art-related concepts such that their use is spontaneous. Thus, it would appear this approach is less effective than the systematic study of these same concepts using the model and materials employed in this study.

One may speculate that the reason for the Experimental Group difference over the Control Group relative to the lengths of their written critiques is that the Experimental Group students had more to write about (i.e., content, concepts, and value terms as opposed to just content and value terms). It is also possible that a consequence of developing conceptual understanding of art-related concepts is more immediate cognitive awareness of an art work, thus providing the individual with more instantaneous in-depth information upon which to write.

The availability of using concepts and the increased cognitive awareness of what an art work contains may free the critic from having to make only value (affective) reactions to the art s/he views. It also may contribute to a decrease in the superficial nature of purely reactive affective responses to the art work. For this reason, the Experimental Group students may not have needed to increase the frequency of their use of value terms in their respective critiques because their "increase" may have been in the qualitative nature of their use of these value terms (e.g., "the lines are very well placed" rather than "it is a real good picture of a man smoking a cigarette."). It is proposed that the data concerning use of value terms and lengths of critiques suggest a qualitative and not a quantitative change in the affective responses of these students to the art they experienced. In addition, it is suggested that this difference may be due primarily to the treatment materials used in this study.

In regards to the findings concerning the students' use of these concept-labels in their drawing and painting critiques, the data reveal that students are much more likely to understand the applicability of a concept they have acquired in situations similar to the one in which they originally "acquired" the concept. For instance, the students in both groups were studying and working with drawings during the entire period of the study. In analyzing the posttest results, the students in both groups appeared to associate the concepts they studied in drawing with drawings and seemed to have some difficulty in "transferring" their conceptual understandings to paintings. Looking at group data only, the Experimental Group students appeared to have had more difficulty with this transferrence process than did their Control Group counterparts even though they still used more of these concept-labels in their painting critiques. However, in looking at individual scores, the transference problem seems more interpretable. Experimental group students who used several concept labels in their critiques of the drawings used less for their printing critiques while those who failed to use concept-labels in their drawing critiques repeated this behavior in reacting to the painting. Meanwhile, there was no consistent pattern among Control group students. These students showed random use of concept-labels for the drawing or painting and their use of concept labels for the drawing set no pattern to suggest how they would respond to the painting. Thus, it seems that on an individual basis, the expectation of transfer is more real than the group data would suggest.

While conventional wisdom suggests that individuals who learn art concepts in one situation will automatically transfer this learning to other situations, the findings of this experimental study reveal that such transferrence is not automatic. Importantly, the findings indicate that such transferrence is likely only when the concepts are studied and learned as "abstractions" and not just as terms related to one medium of art production. Students do need to learn how art-related concepts such as "form," "composition," "proportion," etc. are incorporated into drawing, painting, sculpture, architecture, and other art forms. Thus, it may be that students need to learn how each separate art concept applies to each particular art form and furthermore, must be provided with specific application experiences in these other art areas in order to ensure their conceptual understanding in these different art forms. Where this is not possible, learning activities which stress the understanding of art-related concepts as "abstractions" and which include concrete examples from a wide variety of art areas appear to be the best (and possibly only) alternative.

Finally, this study reveals that the model to develop conceptual understanding and problem-solving abilities has relevance to art and aesthetic awareness education learning activities and that materials based upon the model can significantly affect student learnings and use of art-related concepts. Furthermore, the consequences of these conceptually-oriented learnings appear to be both qualitative and quantitative in terms of student critiques of the art they experience.

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Table 1

Analysis of Variance Values Regarding Student Use of Concept-labels, Value Terms, and Total Number of Words in Their Critiques of the Drawing.

	VARIABLE	N	SOURCE	DF	MEAN SQUARE	F-VALUE	p
PAIR I	Concept-labels used	20 20	Between Grps Within Grps	1 38	96.100 4.671	20.57	.0001*
	Value terms used	20 20	Between Grps Within Grps	1 38	.000 3.200	.00	.95
	Total words in critiques	20 20	Between Grps Within Grps	1 38	5,062.500 1,636.240	3.09	.08
PAIR II	Concept-labels used	15 15	Between Grps Within Grps	1 28	53.333 3.662	14.56	.001*
	Value terms used	15 15	Between Grps Within Grps	1 28	17.633 2.162	8.16	.008*
	Total words in critiques	15 15	Between Grps Within Grps	1 28	18,750.000 750.100	24.67	.0001*
PAIR III	Concept-labels used	35 35	Between Grps Within Grps	1 68	148.629 4.185	35.52	.0001*
	Value terms used	35 35	Between Grps Within Grps	1 68	7.557 2.908	2.60	.10
	Total words in critiques	35 35	Between Grps Within Grps	1 68	20,571.426 1,332.240	15.44	.0001*

* $p < .05$

Note: Pair I represents the 7th grade Experimental Group and the 8th grade Control Group.

Pair II represents the 8th grade Experimental Group and the 8th grade Control Group.

Pair III represents the combined 7th and 8th grade Experimental Group and the combined 8th grade Control Group.

Table 2

Sums, Means, and Standard Deviations of Student Data Regarding Their Use of Concept-labels, Value Terms, and Total Number of Words in Their Critiques of a Drawing.

	VARIABLE	GROUP	N	SUM	MEAN	STANDARD DEVIATION
PAIR I	Concept-labels used	Experimental	20	79	3.95	2.819
		Control	20	17	.85	1.182
	Value terms used	Experimental	20	48	2.40	1.729
		Control	20	48	2.40	1.847
	Total words in critiques	Experimental	20	1,633	81.65	44.098
		Control	20	1,183	59.15	36.439
PAIR II	Concept-labels used	Experimental	15	49	3.27	2.604
		Control	15	9	.60	.737
	Value terms used	Experimental	15	39	2.60	1.805
		Control	15	16	1.07	1.033
	Total words in critiques	Experimental	15	1,205	80.33	32.429
		Control	15	455	30.33	21.645
PAIR III	Concept-labels used	Experimental	35	128	3.66	2.711
		Control	35	26	.74	1.010
	Value terms used	Experimental	35	87	2.49	1.738
		Control	35	64	1.83	1.671
	Total words in critiques	Experimental	35	2,838	81.09	38.990
		Control	35	1,638	46.80	33.827

Note: Pair I represents the 7th grade Experimental Group and the 8th grade Control Group.

Pair II represents the 8th grade Experimental Group and the 8th grade Control Group.

Pair III represents the combined 7th and 8th grade Experimental Group and the combined 8th grade Control Group.

Table 3

Analysis of Variance Values Regarding Student Use of Concept-labels, Value Terms, and Total Number of Words in Their Critiques of the Painting.

	VARIABLE	N	SOURCE	DF	MEAN SQUARES	F-VALUE	p
PAIR I	Concept-labels used	20 20	Between Grps Within Grps	1 38	10.000 1.116	8.96	.005*
	Value terms used	20 20	Between Grps Within Grps	1 38	1.225 1.020	1.20	.28
	Total words in critiques	20 20	Between Grps Within Grps	1 38	6,477.022 1,301.562	4.98	.03*
PAIR II	Concept-labels used	15 15	Between Grps Within Grps	1 28	16.133 1.210	13.34	.001*
	Value terms used	15 15	Between Grps Within Grps	1 28	16.133 1.610	10.02	.004*
	Total words in critiques	15 15	Between Grps Within Grps	1 28	22,908.030 798.600	28.68	.0001*
PAIR III	Concept-labels used	35 35	Between Grps Within Grps	1 68	25.200 1.158	21.76	.0001*
	Value terms used	35 35	Between Grps Within Grps	1 68	3.214 1.442	2.23	.136
	Total words in critiques	35 35	Between Grps Within Grps	1 68	25,574.912 1,153.248	22.18	.0001*

*$p < .05$

Note: Pair I represents the 7th grade Experimental Group and the 8th grade Control Group.

Pair II represents the 8th grade Experimental Group and the 8th grade Control Group.

Pair III represents the combined 7th and 8th grade Experimental Group and the combined 8th grade Control Group.

Table 4

Sums, Means, and Standard Deviations of Student Data Regarding Their Use of Concept-labels, Value Terms, and Total Number of Words in Their Critiques of a Painting.

	VARIABLE	GROUP	N	SUM	MEAN	STANDARD DEVIATION
PAIR I	Concept-labels used	Experimental	20	24	1.20	1.399
		Control	20	4	.20	.523
	Value terms used	Experimental	20	26	1.30	.979
		Control	20	33	1.65	1.040
	Total words in critiques	Experimental	20	1,477	73.85	41.820
		Control	20	968	48.40	29.228
PAIR II	Concept-labels used	Experimental	15	26	1.73	1.334
		Control	15	4	.27	.799
	Value terms used	Experimental	15	32	2.13	1.552
		Control	15	10	.67	.900
	Total words in critiques	Experimental	15	1,140	76.00	37.141
		Control	15	311	20.73	14.757
PAIR III	Concept-labels used	Experimental	35	50	1.43	1.378
		Control	35	8	.23	.646
	Value terms used	Experimental	35	58	1.66	1.305
		Control	35	43	1.23	1.087
	Total words in critiques	Experimental	35	2,617	74.77	39.325
		Control	35	1,279	36.54	27.568

Note: Pair I represents the 7th grade Experimental Group and the 8th grade Control Group.

Pair II represents the 8th grade Experimental Group and the 8th grade Control Group.

Pair III represents the combined 7th and 8th grade Experimental Group and the combined 8th grade Control Groups.

Table 5

Analysis of Variance Values Regarding Experimental and Control Group Students' Use of Concept-labels in Critiquing the Drawing and the Painting.

	VARIABLE	N	SOURCE	DF	MEAN SQUARES	F-VALUE	p
Pair I	Concept-labels used	20 20	Between Grps Within Grps	1 38	75.625 4.951	15.27	.0001*
Pair II	Concept-labels used	15 15	Between Grps Within Grps	1 28	17.633 4.281	4.12	.05*
Pair III	Concept-labels used	20 20	Between Grps Within Grps	1 38	4.225 .836	5.06	.03*
Pair IV	Concept-labels used	15 15	Between Grps Within Grps	1 28	.833 .591	1.41	.24
Pair V	Concept-labels used	70 70	Between Grps Within Grps	1 138	65.829 3.892	16.91	.0001*

*$p < .05$

Note: Pair I represents the 7th grade Experimental Group.

Pair II represents the 8th grade Experimental Group.

Pair III represents the 8th grade Control Group that was paired with the 7th grade Experimental Group.

Pair IV represents the 8th grade Control Group that was paired with the 8th grade Experimental Group.

Pair V represents the combined totals of all four art classes.